

## Can research be planned?

Here is a conundrum: most scientists insist that research cannot be planned, and yet most of them will happily prepare proposals that outline their research for the next three years when applying for funds. It is certainly true that our research often leads us down unexpected avenues. Last year, my group was studying how the promoter of our favourite gene functions and now we are immersed in elucidating the role of the proteasome in the same process. When we embarked on our original strategy, we were unable to predict this change, and yet we would indeed have been foolish to ignore the results that pointed in this new direction. Ergo, research cannot be planned.

Nor can the fruits and practical benefits of research be predicted with any accuracy. The fact that a biotech industry can be built up on the basis of supposedly 'irrelevant' studies of how bacteria protect themselves from infection is enough evidence for me to say "I rest my case." So, not only are we unaware of what we will be working on a year from now, we also do not know what additional benefits—if any—will come from this work. If you add to this the need for intellectual freedom, the inappropriateness of top-down dictation of research that seems to lurk behind the word 'planning', and the horror of performance-related assessment of 'output' and 'deliverables'—two more taboo words for active scientists—then this editorial needs no more words. The answer is clear: research cannot and should not be planned.

But when we apply for funding we use different lyrics. Without blushing, we sketch out plans for the next three years and, in some instances, lay down defined milestones that we expect to meet. With the certainty of the expert, we state that we are at a defined point in determining how life works and that, with the right funding, we will reach the next point and be able to tell the world new facts. Often, we go even further and explain how this information will help to improve society in many ways. We

imply that there is a plan and that we will follow it without deviation. Research can be planned!

To the outside world these are confusing messages. Our research delivered the sequence of the human genome according to a timetable that was equivalent to the process of building a road from A to B. Indeed, the Human Genome Project was a visible success. And it was planned—well, more or less—so why not repeat the trick for other goals? Ah, but that was just technology, the application of well-known methods to meet a clearly-defined goal with the certainty that the repetitive application of these procedures would produce the expected result—just like building a road. Thus, the Human Genome Project is not relevant to this discussion. Nevertheless, the *Arabidopsis* community present their research in fairly similar terms: first sequence the plant genome, then collect proteomic data, then produce a collection of mutants, and so on; and eventually we will understand how plants work. The same is true for the *Medaka* community. And a recent Viewpoint article in this journal expressed the opinion that research in immunology lacks defined goals, and therefore the translation of science into beneficial outcomes is happening too infrequently (A. Coutinho, *EMBO Rep.*, **3**, 1008–1011; 2002). All of these examples point to a greater tolerance within the scientific community towards working to a plan.

The reality is that most research cannot be planned, but it can be organized. If we were not committed anarchists we could accept this notion, provided that there were not too many constraints on how we would have to organize our work. Indeed, organization may be the price we have to pay for using an increasing amount of taxpayers' money. It may also explain why 15,000 groups of scientists submitted expressions of interest in order to get their favourite topics on the list that is to be funded under the European Union's 6th Framework Programme. They were organized, and they

even presented a plan of what they would do if they were funded. However, when the establishment of a European Research Council is discussed, one frequently expressed view is that such a council should be open to all topics, without constraints, and that there should be no plan and no organization of the participants. The same people often use the example of the US National Institutes of Health (NIH), with the perception that there is an open pool of funding available to everybody. But the reality is slightly different; the NIH is organized around institutes focused on disease research, with the idea that their contributions will eventually benefit patients. There is an overall plan, although it is quite different from that needed for a project with commercial aims: it is still research with all of its twists and turns, but it will yield benefits, although in a manner that cannot be defined beforehand.

So if there is to be a new funding programme for Europe, we have to ensure that it is appropriately balanced between organization and planning. Of course, such a balance is quite different for the natural sciences than, for example, developing a new aeroplane. But it may mean that we should be prepared to package the results from top quality research into an integrated context; for instance, understanding how a cell divides. The research needed to explain this process could be diverse, and should be free of constraints, provided that it potentially adds information to answer that question. Clearly, not everyone would be able to fit his or her research into such a framework, but there could be many other topics so that all scientists would be eligible to participate. It is essential that we do not ruin future prospects for much-needed research by insisting that we are a community that cannot be organized—even if we accept that 'planned' is an unacceptable term for the work we pursue.

---

Frank Gannon

doi:10.1038/sj.embor.embor752